

**SIGNIFICANT HABITATS AND HABITAT COMPLEXES  
OF THE NEW YORK BIGHT WATERSHED  
New York - New Jersey Highlands  
COMPLEX #25**

**I. SITE NAME:** New York - New Jersey Highlands

**II. SITE LOCATION:** The New York - New Jersey Highlands are located in northern New Jersey and southeastern New York. The entire complex extends in the watershed from the Delaware River northeast across the Hudson River into southwestern Connecticut.

**TOWNS:** 110 municipalities (see list)

**COUNTIES:** Fairfield, CT; Bergen, Morris, Passaic, Sussex, Warren, NJ; Dutchess, Orange, Putnam, Rockland, Westchester, NY

**STATES:** Connecticut, New Jersey, New York

**USGS 7.5 MIN QUADS:** Califon, NJ (40074-67), Mendham, NJ (40074-75), Chester, NJ (40074-76), Hackettstown, NJ (40074-77), Boonton, NJ (40074-84), Dover, NJ (40074-85), Stanhope, NJ (40074-86), Tranquility, NJ (40074-87) Mohegan Lake, NY (41073-37), Peekskill, NY (41073-38), Brewster, NY-CT (41073-45), Lake Carmel, NY (41073-46), Oscawana Lake, NY (41073-47), West Point, NY (41073-48), Pawling, NY-CT (41073-55), Poughquag, NY (41073-56), Hopewell Junction, NY (41073-57), Wappingers Falls, NY (41073-58), Ramsey, NJ-NY (41074-12), Wanaque, NJ (41074-13), Newfoundland, NJ (41074-14), Franklin, NJ (41074-15), Newton East, NJ (41074-16), Thiells, NY (41074-21), Sloatsburg, NY-NJ (41074-22), Greenwood Lake, NY-NJ (41074-23), Wawayanda, NJ-NY (41074-24), Hamburg, NJ (41074-25), Popolopen Lake, NY (41074-31), Monroe, NY (41074-32), Warwick, NY (41074-33), Pine Island, NY-NJ (41074-34), Unionville, NY-NJ (41074-35), Cornwall, NY (41074-41), Maybrook, NY (41074-42)

**USGS 30 x 60 MIN QUADS:** Newark, NJ-NY (40074-E1), Allentown, PA-NJ (40075-E1), Bridgeport, CT-NY-NJ (41073-A1), Waterbury, CT-NY (41073-E1), Middletown, NY-NJ (41074-A1)

**III. BOUNDARY DESCRIPTION AND JUSTIFICATION:** The entire physiographic province of the New York - New Jersey Highlands (Highlands), shown by a dashed line and light shading on the map, follows the boundary between the Highlands and Piedmont physiographic provinces on the southeast, and between the Highlands and the Appalachian Ridge and Valley provinces on the northwest, from the Delaware River northeast across the Hudson River to Candlewood Lake in southwestern Connecticut. The Highlands province is distinguishable from the adjoining provinces by differences in geology, topography, and geomorphology (landforms). The entire physiographic area is noteworthy as a relatively undeveloped corridor of forests, wetlands, and grasslands of regional importance to breeding and migratory birds, resident amphibians and reptiles, and rare plants and communities within close proximity to the New York City metropolitan area. The principal significant habitat (darker shading on the map) is the core area of unfragmented forest and wetlands within the Highlands physiographic province, extending from the glacial moraine (at about the location of Interstate 80 in New Jersey) northeast across the Hudson River to the New York-Connecticut border. This core habitat area has the highest concentration within the Highlands of species and communities of special regional emphasis dependent on large, unfragmented forest and wetland habitats. The focus of

this narrative is on the core habitat area within the context of the entire physiographic province.

**IV. OWNERSHIP/PROTECTION/RECOGNITION:** A regional study of the Highlands by the U.S. Forest Service in 1992 documented the occurrence and ownership status of 65,000 hectares (160,000 acres) of publicly owned land between the Hudson and Delaware Rivers, or about 16% of the total land area of the Highlands. This consists of 15,000 hectares (38,000 acres) of federal land, 38,000 hectares (94,000 acres) of state parks and forests, 5,700 hectares (14,000 acres) of state wildlife management areas, and 6,100 hectares (15,000 acres) of county parks. An additional 6,100 hectares (15,000 acres) of federally and state-owned lands occur in the Highlands northeast of the Hudson River. Some of the larger parcels within the Highlands include the 18,600-hectare (46,000-acre) Harriman State Park and the adjoining 2,000-hectare (5,000-acre) Bear Mountain State Park, the 6,500-hectare (16,000-acre) West Point Military Academy, and the 4,200-hectare (10,500-acre) Waywayanda State Park. There are several large holdings of private forest lands, prominent among which are Sterling Forest, Black Rock Forest, and Schunnemunk Mountain. There are also over 19,500 hectares (48,000 acres) of water supply or reservoir lands, including the 14,200-hectare (35,000-acre) Pequannock watershed supplying water for the city of Newark. The city of New York owns land throughout the Croton, Bay Brook, and East Branch reservoir systems east of the Hudson. The significant core habitat area north of the moraine has a greater percentage, at least 23% (45,000 hectares [111,195 acres]), of publicly owned land than does the southern area of the physiographic region. The U.S. Fish and Wildlife Service has designated several wetland areas, including Beaver Brook, Washington Valley Reservoir, and Utertown Bog, as priority wetland sites under the federal Emergency Wetlands Resources Act of 1986. Wetlands are regulated in New York under the state's Freshwater Wetlands Act of 1975 and Tidal Wetlands Act of 1977, and in New Jersey under the Freshwater Wetland Protection Act and Wetlands Act of 1970; these statutes are in addition to federal regulation under Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act of 1977, and various Executive Orders.

New York State recognizes three Significant Coastal Fish and Wildlife habitats within the Hudson River portion of the Highlands: Iona Island Marsh, Constitution Marsh, and Hudson River mile 44-56. These areas are described in more detail in the Mid and Lower Hudson River Estuary narratives (see p. 879 and p. 629). New York State has also designated a 5.5-kilometer (3.4-mile) segment of the Ramapo River in Slootsburg as a Recreational River under the Wild, Scenic, and Recreational Rivers Act. The New York State Natural Heritage Program, in conjunction with The Nature Conservancy, recognizes several Priority Sites for Biodiversity within the New York - New Jersey Highlands habitat complex. These sites are listed here along with their biodiversity ranks (only sites with biodiversity ranks of B1 through B3 are listed for New York State): Island Pond Tuxedo/Echo Lake (B2 - very high biodiversity significance), Lily Pond Haverstraw (B2), Little Cedar Pond (B2), Schunnemunk Mountain (B2), Anthony's Nose (B3 - high biodiversity significance), Bellvale Mountain (B3), Breakneck Ridge (B3), Brewster Pond Cedar Swamp (B3), Constitution Marsh (B3), Crows Nest (B3), Dunderberg Mountain (B3), Durland Hill (B3), Iona Island (B3), Lake Tonetta Cedar Swamp (B3), Scofield Ridge (B3), Storm King Mountain (B3), Suffern Hills (B3), and Sugarloaf Mountain (B3). The New Jersey Natural Heritage Program recognizes several Priority Sites for Biodiversity within the Highlands. These sites are listed here along with their biodiversity ranks: Breakneck Mountain (B3 - high biodiversity significance), Cherry Ridge Ravine (B3), Sparta Pine Swamp (B3), Waywayanda Lake (B3), Waywayanda Swamp (B3), Bearfort Mountain Macrosite

(B4 - moderate biodiversity significance), Beech Road Ridge (B4), Budd Lake outlet (B4), Edison Bog (B4), Green Pond Mountain Macrosite (B4), Highlands Megasite (B4), Morris Lake (B4), Morris Lake Woods (B4), Mount Hope Bog (B4), New Russia Gravel Pit (B4), Seems Like a Good Place (B4), Sparta Glen (B4), Splitrock Reservoir (B4), Uttertown Bog (B4), and Wawayanda Macrosite (B4).

**V. GENERAL AREA DESCRIPTION:** The New York - New Jersey Highlands is a rugged, high elevation region of forested ridges and valleys extending from the Delaware River northeast across the Hudson River into Connecticut. The Highlands are a part of the Reading Prong, an extension of the New England Upland physiographic province extending from near Candlewood Lake in southwestern Connecticut toward the southwest across the Hudson and Delaware Rivers to the Reading Hills in Pennsylvania. The Highlands rise prominently above the lower-lying Piedmont physiographic region to the southeast and the Great Valley system to the northwest. The New York - New Jersey Highlands region from the Delaware River into Connecticut is about 117 kilometers (110 miles) long and ranges from 8 to 32 kilometers (5 to 20 miles) in width. The core significant habitat area north of the moraine is about 113 kilometers (70 miles) long and 200,000 hectares (491,000 acres). Topography in the Highlands is characterized by a series of northeast-trending ridges and valleys with elevations ranging from about 43 meters (140 feet) above sea level at the Delaware River and 3 meters (10 feet) at its base at the Hudson River to over 425 meters (1400 feet) on the highest ridges. The flat ridgetops in the Highlands occur at about the same elevation and represent an advanced stage of erosion, resulting in a peneplain. The geology consists primarily of metamorphic, crystalline rocks dominated by gneiss on the ridges and more easily erodible sedimentary sandstone, dolomite, and shale underlying the valleys. One exception is the Bellvale Mountain/Bearfort Mountain Ridge, which is composed of sedimentary shales and sandstones as a result of the infolding of sediments equivalent to those forming the Kittatinny Ridge and parts of the Allegheny Plateau to the west. The most recent (Wisconsin) glaciation extended across much of the Highlands, leaving a terminal moraine trending east to west across the Highlands in northern New Jersey. The moraine enters the Highlands from the east at Morristown, New Jersey, then trends north for a short distance to Denville, then west across the Highlands at about the location of Interstate 80 to Belvidere on the Delaware River. North of the moraine, there are significant accumulations of glacial till outwash and numerous lakes and wetlands, reflecting the complicated drainage pattern of the glaciated region. There are several major watersheds within the Highlands, including direct Hudson River drainages east and west of the river, and the Passaic River, Wallkill River, Raritan River, and Delaware River drainages.

The **core habitat area** contains continuous and relatively unfragmented forests, higher elevation ridges, and networks of relatively undisturbed wetlands in the valleys. The forest is dominated by upland hardwood forest types on the ridges and valley slopes, and forested wetlands in the valleys. The most common upland forest type is the dry-mesic (dry to moderately moist), mixed-oak forest dominated by red (*Quercus rubra*), black (*Q. velutina*), and white (*Q. alba*) oaks with lesser numbers of white ash (*Fraxinus americana*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), chestnut oak (*Quercus prinus*), scarlet oak (*Q. coccinea*), hickory (*Carya* spp.), American beech (*Fagus grandifolia*), and tulip tree (*Liriodendron tulipifera*). Flowering dogwood (*Cornus florida*) and maple-leaved viburnum (*Viburnum acerifolium*) are dominant understory trees and shrubs, with hop hornbeam (*Ostrya virginiana*), ironwood (*Carpinus caroliniana*), and sassafras (*Sassafras albidum*) also present. Another common forest

type, occurring primarily in ravines or cool north-facing slopes, is the mesic (moderately moist), hemlock-hardwood forest dominated by eastern hemlock (*Tsuga canadensis*) with red maple, sugar maple, yellow birch (*Betula lutea*), sweet birch (*B. lenta*), American basswood (*Tilia americana*), American beech, white ash, and tulip tree. The understory shrub and herbaceous layer is generally sparse under the hemlocks, with the exception of rhododendron (*Rhododendron maximum*) thickets in some places. A recent infestation of the hemlock wooly adelgid (*Adelges tsugae*) has killed many of the hemlocks in the Highlands and will likely result in a major change in the forest community in these areas. Another, more xeric (dry), forest type found on steep slopes and dry ridgetops is the chestnut oak forest with dominance by chestnut oak and associated species including scarlet, white, black, and scrub (*Quercus ilicifolia*) oaks, pitch pine (*Pinus rigida*), sweet birch, and hickories, with a shrub layer of heaths, including blueberries (*Vaccinium* spp.), mountain laurel (*Kalmia latifolia*), and black huckleberry (*Gaylussacia baccata*). On the exposed ridgetops, a pitch pine-scrub oak community is found, dominated by pitch pine with lesser numbers of sweet birch, red maple, gray birch (*Betula populifolia*), serviceberry (*Amelanchier* spp.), chestnut, scarlet, and white oaks, and a shrub layer of scrub oak in exposed areas, black huckleberry and various other shrubs in protected areas, and grasses in open areas. Unvegetated rock faces and outcrops are found on all the ridges in the Highlands and talus slopes typically occur at the bases of steep cliffs.

In the valleys there are numerous forested wetlands; commonly, these are red maple swamps dominated by red maple with black gum (*Nyssa sylvatica*), ashes (*Fraxinus* spp.) and yellow birch, a shrub layer of highbush blueberry (*Vaccinium corymbosum*), speckled alder (*Alnus rugosa*), spicebush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), swamp azalea (*Rhododendron viscosum*), and winterberry (*Ilex verticillata*), and groundcovers of skunk cabbage (*Symplocarpus foetida*), ferns, and mosses. Other less common forested wetlands found in the Highlands include hardwood-conifer swamps with red maple and eastern hemlock as co-dominants with a rhododendron understory, and floodplain forests along the rivers dominated by a variety of hardwood species. There are also several regionally rare wetland communities occurring in the glaciated portion of the Highlands, including inland Atlantic white cedar swamps, black spruce swamps, shrub swamps, and dwarf shrub bogs (see rare communities section, p. 113).

The Highlands area was settled by colonists beginning in the 1700s, with the rich iron resources in the Highlands as the main impetus for settlement. Land was cleared for communities and agriculture to support the iron industry, and the demand for charcoal resulted in extensive cutting of forests. With the decline in the iron industry in the late 1800s, the forests were allowed to regrow. At present, most of the forests are second or third growth, except for some inaccessible areas, notably hemlock ravines whose forest stands are considerably older. A hemlock grove in Waywayanda State Park has a soil profile which indicates 17,000 years of continuous growth as a pure hemlock stand. Headwaters of several major rivers including the Wallkill, Pequannock, Ramapo, Passaic, Raritan (North and South branches), and Croton. There are 10 major reservoirs in New Jersey, supplying water for the state's major cities, and 13 major reservoirs on the east side of the Hudson River that are part of New York City's water supply system.

South of the core habitat area and moraine, the Highlands continue southwest to the Delaware River and include Jenny Jump Mountain, Pohatcong Mountain, and Musconetong Ridges. This area has forested ridges of a lower elevation than the core area, and wider valleys dominated by agricultural, suburban, and urban developed areas. The valleys are underlain by calcareous bedrock, and the physiographic distinction between the Highlands and the Ridge and Valley

Province to the west is less clear.

**VI. ECOLOGICAL SIGNIFICANCE/UNIQUENESS OF SITE:** The ecological significance of this area relates to its large, contiguous forest and wetland habitats and the disturbance-sensitive species dependent on these habitats, as well as the diversity of plants, communities, and animals unique to this region. Species populations in the Highlands indicative of undisturbed forest and wetland habitats include wood turtle (*Clemmys insculpta*), timber rattlesnake (*Crotalus horridus*), red-shouldered hawk (*Buteo lineatus*), barred owl (*Strix varia*), warblers and thrushes, black bear (*Ursus americanus*), bobcat (*Lynx rufus*), and native brook trout (*Salvelinus fontinalis*). The Highlands regional study conducted by the U.S. Forest Service estimated that roughly 50% of the area between the Delaware and Hudson Rivers, or about 500,000 acres, is important habitat based on the presence of species that are endangered, threatened, or of special concern.

Both the Highlands and the Kittatinny Ridge (Shawangunk - Kittatinny Ridge habitat narrative, p. 666), as the southernmost extent of glaciated, higher elevation habitat in the watershed, contain the southernmost occurrences in the region of several northern species and communities, such as northern bogs, that occur only in glaciated terrain. Several northern species that are listed as endangered in New Jersey occur only in the Highlands, although many of these species are more common to the north.

There are 312 species of special emphasis occurring in the Highlands, incorporating 147 species of birds and 123 species of plants, and including the following federally listed species. The large list of additional state-listed species follows this narrative. (Living resources and their habitats are dynamic; therefore, the ecological significance and species information presented here may not be complete or up-to-date. State and federal environmental agencies (see Appendix III for office contacts) should be consulted for additional information.)

**Federally listed endangered**

bald eagle (*Haliaeetus leucocephalus*)

Indiana bat (*Myotis sodalis*)

**Federally listed threatened**

swamp pink (*Helonias bullata*)

**Federal candidate**

bog turtle (*Clemmys muhlenbergii*)

**Federal species of concern<sup>(1)</sup>**

northern goshawk (*Accipiter gentilis*)

cerulean warbler (*Dendroica cerulea*)

small-footed bat (*Myotis leibii*)

variable sedge (*Carex polymorpha*)

**Breeding and Migrating Songbirds and Raptors**

For thousands of years, the ridges of the Highlands have been used as a visual guideline for songbirds and raptors during spring and fall migrations, with the forests and wetlands providing food and resting places for the migrants. The forests, wetlands, and successional habitats of the Highlands support about 150 species of breeding birds. Many of these species are generally associated with relatively unfragmented, undisturbed forest interior habitats. Examples include wood thrush (*Hylocichla mustelina*), ovenbird (*Seiurus aurocapillus*), and hooded warbler (*Wilsonia citrina*) which breed in the mesic forests, black-throated green warbler (*Dendroica virens*) and black-throated blue warbler (*Dendroica caerulescens*) which prefer the hemlock

forests, Louisiana waterthrush (*Seiurus motacilla*) which breeds in riparian areas, and barred owl (*Strix varia*) and red-shouldered hawk (*Buteo lineatus*) which prefer the large wooded swamps. The New York State Breeding Bird Atlas indicates a thriving population of cerulean warbler in the deciduous forests of the Highlands, one of the few concentrations of this species in the state. Golden-winged warbler (*Vermivora chrysoptera*), another rare breeder in the region, is locally common in the successional forests of the Highlands. The Highlands support 24 of the 29 middle and long-distance migrant birds whose numbers have declined significantly in the Northeast, as indicated by analysis of the breeding bird survey, and 26 of the 35 long-distance migrants ranked in a recent Partners in Flight study as of highest concern in the Northeast. These migrants include both successional and forest-nesting species.

There are 19 raptor species that utilize the Highlands seasonally or year-round, 10 of which breed in this area, including the regionally rare Cooper's hawk (*Accipiter cooperii*), northern goshawk, sharp-shinned hawk (*Accipiter striatus*), red-shouldered hawk, northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), barred owl, common barn-owl (*Tyto alba*), and, probably, northern saw-whet owl (*Aegolius acadicus*). Hawk watches occur at nine sites in the Highlands: Bearfort Mountain, Bowling Green Fire Tower, Breakneck Mountain, Waywayanda, and Windbeam Tower in New Jersey; and Mount Peter, Whitehorse Mountain, Bear Mountain, and Storm King Mountain in New York. These hawk watches have documented the importance of this region to both spring and fall migrating hawks. Species regularly observed include fall migrations of osprey (*Pandion haliaetus*), sharp-shinned hawks, broad-winged hawks (*Buteo platypterus*), red-tailed hawks (*Buteo jamaicensis*), and kestrels (*Falco sparverius*), and spring migrations of the same species along with red-shouldered hawks.

### **Reptiles and Amphibians**

At least 45 species (a high diversity) of amphibian and reptile species, including several rare species, have populations in the Highlands. Among them is the timber rattlesnake, a regionally rare and vulnerable species listed as endangered in New Jersey and threatened in New York. Its populations in the Highlands are an important stronghold for this species in the region, and include at least 30 known den sites in New York and at least 10 known den sites in New Jersey. These den sites tend to be in or near wooded rocky ledges with southern exposures. The distribution of known den sites and home ranges suggests that there are at least three distinct subpopulations of rattlesnakes within the Highlands, separated by two major barriers: Interstate 87 and the Hudson River. Important concentration areas occur in **Sterling Forest** and adjacent ridges, **Beech Road Ridge**, **Bellvale Mountain**, **Bear Mountain/Harriman/West Point**, and the **Hudson Highlands State Park** and adjacent areas northeast of the Hudson. Copperheads (*Agkistrodon contortrix*) cohabit many of the den and basking sites of the timber rattlesnake. The wood turtle is found in or near riparian habitat throughout the Highlands, especially near deep, low gradient streams in the spring and winter and, generally, in more terrestrial habitats in the summer. Bog turtles historically occurred in several wetland areas in the Highlands, such as in Harriman State Park and in northern Westchester and southern Putnam Counties; remnant populations probably still occur in these areas, though much of the preferred habitat has been altered or fragmented due to development and impoundment of wetlands. Extant populations occur along the northwestern edge of the Highlands where the Highlands abut the calcareous lowlands of the Appalachian Ridge and Valley Province. Populations also occur at the northeastern edge of the Highlands in the Great Swamp and East Fishkill (see also narratives for Harlem Valley Calcareous Wetlands Complex, p. 763, and Dutchess County Wetlands Complex, p. 785), along the western edge of the Highlands in the **Chester Hills** in Orange County, New

York, and in the upper Wallkill River watershed (see also Upper Wallkill River Valley habitat narrative, p. 811), as well as in areas south of the core area including **Black River Wildlife Management Area**. The northern fence lizard (*Sceloporus undulatus hyacinthinus*) and five-lined skink (*Eumeces fasciatus*) occur locally on rocky ledges in the Highlands just east of the Hudson and the five-lined skink is locally distributed throughout areas west of the Hudson. Amphibians in the Highlands include regionally rare salamanders such as the blue-spotted (*Ambystoma laterale*) and four-toed (*Hemidactylium scutatum*) salamanders, as well as eastern spadefoot toad (*Scaphiopus holbrookii*) and several populations in Harriman State Park of northern cricket frog (*Acris c. crepitans*), which constitute some of the northernmost known occurrences of this species.

### **Mammals**

Over 40 species of mammals, including several large and free-roaming mammal species, occur in the Highlands. A moderate-sized population of black bear is centered on **Bearfort Mountain** and the surrounding lakes region in north-central New Jersey and across the border into adjacent New York. A recent study located 28 winter dens of 18 individuals over two denning seasons; the total population in the Highlands is estimated to be greater than 150 individuals. Bears were generally found in the forested regions, specifically in the swamps and lowland forests. Dens occurred in both wetlands and upland areas. Almost all of the bear locations were within 200 meters (650 feet) of wetlands. Den site location was generally greater than 500 meters (1,600 feet) from roads and occupied dwellings. Male bears had average home ranges of 182 square kilometers (70 square miles), and ranged well across the state border into New York. The Bearfort population is one of only two remaining black bear populations in New Jersey; the other population occurs on the Kittatinny Ridge. The hunting season for bear in New Jersey has been closed since 1971, but bears are still hunted in nearby New York. The highly secretive bobcat is an endangered species in New Jersey, though still a game species in New York. River otter (*Lutra canadensis*) occurs in several of the wetland systems, including parts of the Croton watershed and Kensico Reservoir, and has ranges of 24 or more kilometers (15 or more miles). The federal species of special concern Allegheny woodrat (*Neotoma magister*) once occurred at several talus slopes in the Highlands, including the last known occurrence in New York State at Storm King Mountain in 1986. Abandoned iron mines within the Highlands in New Jersey and New York provide winter hibernacula for several species of bats, including the federally listed endangered Indiana bat, the species of concern small-footed bat, northern long-eared myotis (*Myotis septentrionalis*), little brown bat (*M. l. lucifugus*), eastern pipistrelle (*Pipistrellus subflavus*), and big brown bat (*Eptesicus fuscus*). There are hundreds of abandoned mines in the Highlands, and at least 10 known mines in both states in the Highlands are currently being used as winter bat hibernacula. The federally listed endangered Indiana bat is known to occur at three abandoned mines in the Highlands.

### **Fisheries**

The New York - New Jersey Highlands support an extensive and diverse array of fishery habitats. The various habitats include cold, cool, and warm water systems and major anadromous fish runs in the Delaware and Hudson Rivers. There are five major watersheds within the Highlands complex: Hudson, Passaic, Wallkill, Delaware, and Raritan, with 21 subwatersheds. The great species diversity that is supported throughout the region is an indication of the high ecological value of this habitat. Trout are the most extensive and widespread cold and cool water species; brook, brown (*Salmo trutta*), and rainbow (*Oncorhynchus mykiss*) trout are the predominant species, with lake trout (*Salvelinus namaycush*) living in some of the specialized

lake habitats. There are a number of streams classified as trout production waters; these support naturally reproducing brook trout populations. Additionally, there are many rivers, streams, and creeks that are managed as trout fisheries through various stocking strategies. Water quality is a primary determinant in all trout waters, especially where native populations occur. Suitable habitat needs include water temperatures not exceeding 21° C (70° F), dissolved oxygen levels over 4 parts per million, areas of gravelly bottom that are free of silt, and an adequate supply of macroinvertebrate food items. Suitable trout habitat depends on adequate forest buffers and tree canopies to provide good water quality and stable temperatures. Because the Highlands terrain is steep, wider than usual forest buffers are needed to protect important spawning and nursery areas in high gradient streambeds.

In addition to riverine habitats, the Highlands region contains numerous lakes, ponds, and reservoirs. Trout species and smallmouth bass tend to dominate the cold and cooler water systems, while yellow perch (*Perca flavescens*) and smallmouth bass (*Micropterus dolomieu*) are found in the warmer water lakes, ponds, and impoundments. Several of the larger cold water bodies have lake trout and provide regionally important recreational opportunities. Other important species that are found in these waterbodies include members of the following families: lampreys (Petromyzontidae), pirate perch (Aphredoderidae), suckers (Catostomidae), sunfish (Centrarchidae), sculpins (Cottidae), minnows and carp (Cyprinidae), killifishes (Cyprinodontidae), pikes (Esocidae), and perches (Percidae). The Highlands support recreational fisheries in most waterbodies, with expenditures for the region southwest of the Hudson estimated at over 100 million dollars.

### **Rare Communities and Plants**

**Rocky summit grasslands** are grassland communities that occur on the shallow soils of rocky summits, ridges, and slopes dominated by grasses such as little bluestem (*Schizachyrium scoparium*), poverty grass (*Danthonia spicata*), and Indian grass (*Sorghastrum nutans*). Other characteristic species include ebony spleenwort (*Asplenium platyneuron*), eastern red cedar (*Juniperus virginiana*), and the regionally rare dittany (*Cunila origanoides*). High quality occurrences of this community within the Highlands occur in the **Suffern Hills** in the Ramapos, **Scofield Ridge** on the east side of the Hudson River, and the **Chester Hills** (Sugarloaf Mountain and Durland Hill) just west of the Highlands in Orange County, New York. Rare plants include Bicknell's sedge (*Carex bicknellii*) at Durland Hill and yellow harlequin (*Corydalis flavula*) at Suffern Hills. Timber rattlesnake den and basking areas also occur at several of these sites. Another regionally rare ridgetop community is the **pitch pine-oak-heath rocky summit community** occurring on many of the ridgetops in the Highlands, including **Bellvale/Bearfort Mountain**, **Schunemunk Mountain**, **Crows Nest**, and **Breakneck Ridge**. Several rare sedges occur in some of these areas, including hay sedge (*Carex argyrantha*), Bicknell's sedge, and clustered sedge (*Carex cumulata*). Timber rattlesnake occurs at several of these sites, and eastern fence lizard occurs at Breakneck Ridge.

**Talus communities** occur at the bases of steep ridge slopes, with typical areas averaging 40 to 60% canopy coverage by chestnut oak, scrub oak, white pine (*Pinus strobus*), and sweet birch. One example from the New Jersey portion of the Highlands is **Breakneck Mountain**, a steep, northwest-facing talus slope with Dewey's sedge (*Carex deweyana*), Hitchcock's sedge (*Carex hitchcockiana*), purple clematis (*Clematis occidentalis*), oak fern (*Gymnocarpium dryopteris*), fly honeysuckle (*Lonicera canadensis*), pellitory (*Parietaria pennsylvanica*), and the only known state occurrence of red pine (*Pinus resinosa*). Talus slope communities also occur at several locations in New York, including Schunemunk Mountain, Storm King Mountain, and



Dunderberg Mountain. Timber rattlesnake occur at several of these talus slope communities, and Allegheny woodrat historically occurred on talus slopes in the Highlands.

Exemplary occurrences of several forest types occur in the Highlands, including **chestnut oak forest** at Bellvale/Bearfort Mountain, Schunnamunk Mountain, and Anthony's Nose. An unusual variant of the **Appalachian oak-hickory forest** occurs on **Dunderberg Mountain**. Several rare plants occur here, including dittany and yellow harlequin.

**Atlantic white cedar** (*Chamaecyparis thyoides*) **swamps** have a fairly restricted distribution inland, away from the coast. The only inland Atlantic white cedar swamp occurrences in the watershed are in the Highlands and the Kittatinny Mountains. These swamps are dominated by Atlantic white cedar, sometimes grading into a hardwood-conifer swamp with red maple, black gum, and eastern hemlock, and a shrub layer dominated by winterberry, smooth winterberry (*Ilex laevigata*), rhododendron, highbush blueberry, swamp azalea, and sweet pepperbush (*Clethra alnifolia*), and ground covers of ferns and *Sphagnum* mosses. Examples include **Little Cedar Pond in Sterling Forest**; **Waywayanda Swamp** in New Jersey, a large cedar swamp with an occurrence of the state-listed endangered stiff club-moss (*Lycopodium annotinum*); and two small sites at the northeastern end of the Highlands in Putnam County, **Tonetta Cedar Swamp** and **Brewster Pond Cedar Swamp**. Little Cedar Pond is a large (61-hectare [150-acre]) inland Atlantic white cedar swamp in excellent condition, the best example in the study area (and possibly in the world) of this natural community. **Sparta Pine Swamp** in New Jersey is a rare hardwood-conifer swamp community containing rare plants, including Fernald's meadow grass (*Puccinellia fernaldii*).

**Dwarf shrub bogs** are peat bogs dominated by low-growing, evergreen heath (ericaceous) shrubs, typically leatherleaf (*Chamaedaphne calyculata*). This bog type is fairly common in New England and northern New York, but rare in New Jersey and fairly rare in the watershed. Examples include: **Mount Hope Bog**, located on the moraine at the southern end of the core area; **Uttertown Bog**, a northern bog associated with a wooded swamp, lake shore, and upland habitats containing several northern plants that are rare in New Jersey, among which are bog rosemary (*Andromeda glaucophylla*), creeping snowberry (*Gaultheria hispidula*), northern stitchwort (*Stellaria borealis*), and mountain holly (*Ilex montana*), and also containing populations of barred owl, timber rattlesnake, and the globally rare lateral bluet damselfly (*Enallagma laterale*); **Edison Bog**, a northern bog with historical occurrences of several rare plant species; and **Little Cedar Pond** in Sterling Forest, with a shrub bog occurring between the pond and inland Atlantic white cedar swamp. Small dwarf shrub bogs also occur at numerous other locations within the New York portion of the Highlands.

**Black spruce swamps** are northern conifer swamps growing on peat and dominated by black spruce (*Picea mariana*), sometimes with co-dominance by tamarack (*Larix laricina*). This community is common in northern New England and New York, but is rare in the region. One example, **Budd Lake Bog** in New Jersey, occurs right on the terminal moraine. Adjacent to this swamp is an area of boggy woods with both historical and extant rare plant records, including occurrences of marsh cinquefoil (*Potentilla palustris*).

Aquatic communities in the Highlands that contain rare plant species include **Waywayanda Lake**, with populations of several rare aquatic plants, including water marigold (*Megalodonta beckii*), small waterwort (*Elatine minima*), lake quillwort (*Isoetes macrospora*), white-stemmed pondweed (*Potamogeton praelongus*), and Robbin's pondweed (*Potamogeton robbinsii*), and several ponds in **Harriman State Park** containing the only occurrences of large floating bladderwort (*Utricularia inflata*) in the region or in New York State. Aquatic communities also

support regionally rare insect communities, most notably the lateral bluet damselfly. Several ponds in the Highlands support this species, including exemplary occurrences at Lily Pond Haverstraw and Island Pond Tuxedo/Echo Lake, with other known occurrences at Green Pond and Cranberry Pond.

**Hemlock ravines** contain hemlock-hardwood forests as described above. Good examples in the Highlands include **Cherry Ridge Ravine**, an extensive hemlock ravine with wooded swamp and seepage areas and associated rare plants including hemlock parsley (*Conioselinum chinense*), fly honeysuckle (*Lonicera canadensis*), rosy twisted-stalk bellwort (*Streptopus roseus*), witch hobble (*Viburnum alnifolium*), and northern blue violet (*Viola septentrionalis*); and **Sparta Glen**, a hemlock ravine whose rocky woods and slopes contain rare plants such as rosy twisted stalk bellwort and Carolina wood vetch (*Vicia caroliniana*).

#### **Other Focus Areas**

**Sterling Forest** is a large (7,080-hectare [17,500-acre]) privately owned area of contiguous forest and wetlands at the heart of the New York - New Jersey Highlands. The forests are primarily mixed oak forest, with hemlock-hardwood forest in the low-lying areas. The central core of Sterling Forest is the largest contiguous block of intact forest in the entire Highlands region. Sterling Forest is a key area for those species such as barred owl and red-shouldered hawk that rely on large unfragmented forest and wetland areas. The complex of ridges and valleys in and adjacent to Sterling Forest is one of the more important areas, with 10 known den sites, for timber rattlesnake in the Highlands and in the region. Several of the numerous abandoned mines in this area are known to be hibernacula for bats, including small-footed bat. Numerous species of forest interior-nesting Neotropical migrants nest here, including the regionally rare golden-winged warbler. Rare wetland communities occur at Little Cedar Pond within Sterling Forest. Sterling Forest is also a headwater area for several water supplies.

A survey of flora by the New York State Museum in **Harriman** and **Bear Mountain State Parks** is both representative and indicative of the diversity of flora in the Highlands. This study documented 1,360 plant species, including 60 rare species; 12 rare sedges (*Carex* spp.) were found during the course of the survey. Rare species are concentrated mostly in the **tidal wetlands** along the Hudson River; on the shorelines adjacent to the Hudson River, especially **Iona Island** and **Dunderberg Mountain**; on dry ridgetops; and in inland freshwater wetlands. Rarities include the only state occurrences of large floating bladderwort, snakeroot (*Aristolochia serpentaria*), featherfoil (*Hottonia inflata*), and one of the northernmost known occurrences of Virginia pine (*Pinus virginiana*) in its range. More detailed descriptions of the communities on Iona Island and Constitution Island are provided in the narrative for the Mid-Hudson River Estuary, p. 879.

The boundary for the significant habitat area in the New Jersey portion of the Highlands matches the New Jersey Heritage Program's **Highlands Megasite** that contains within it a number of smaller macrosites and priority sites for biodiversity (standard sites). There are three contiguous macrosites and 16 standard sites in New Jersey enclosed in the Highlands megasite. The Waywayanda Macrosite, Green Pond Mountain Macrosite, and Bearfort Mountain Macrosite are all delineated to encompass contiguous forest habitat important for forest interior-nesting raptors that are sensitive to disturbance, including northern goshawk, red-shouldered hawk, and barred owl. The **Waywayanda Macrosite** also contains a great blue heron (*Ardea herodias*) heronry and several specific habitat areas important for rare species and communities. The **Bearfort Mountain Macrosite** comprises mostly undeveloped watershed and state park lands, and contains concentrations of wood turtle and rare communities as well as several rare plant species,

including brownish sedge (*Carex brunnescens*) and northern blue violet. **Green Pond Mountain Macrosite** contains the rare raptors and reptiles mentioned above as well as several rare insects, including mottled darner (*Aeshna clepsydra*), spatterdock darner (*Aeshna mutata*), black-tipped darner (*Aeshna tuberculifera*), lilypad clubtail (*Arigomphus furcifer*), arrowhead spiketail (*Cordulegaster obliqua*), sable clubtail (*Gomphus rogersi*), Williamson's emerald (*Somatochlora williamsoni*), and lateral bluet damselfly, and rare plants such as Bradley's spleenwort (*Asplenium bradleyi*) and narrow-leaved bur-reed (*Spargonium angustifolium*). **Beech Road Ridge**, across the state border from Sterling Forest, contains barred owl and timber rattlesnake and historical occurrences of several rare plant species. **Splitrock Reservoir** is an area of mixed deciduous woodlands supporting the rare three-birds orchid (*Triphora trianthophora*). **Seems Like a Good Place** site is an area of open rock ledges occurring on a wooded hillside that contains the only known extant occurrence of slender pinweed (*Lechea tenuifolia*).

### **South of Core Area**

In addition to providing an important physical and biological connection between the northern core area of the Highlands region and the large forested areas across the Delaware River in Pennsylvania, the forested areas of the southwestern region of the Highlands support small numbers of many of the same species supported by the core habitat area to the north, including populations of wood turtle. The valleys contain species that are more common in the Piedmont province immediately to the south, notably grassland-nesting birds. Grassland-nesting birds in this area include bobolink (*Dolichonyx oryzivorus*), upland sandpiper (*Bartramia longicauda*), grasshopper sparrow (*Ammodramus savannarum*), and savanna sparrow (*Passerculus sandwichensis*). Bald eagle nests just outside of the southern Highlands near the Round Valley Reservoir.

Two large forested areas of particular importance identified by the U.S. Forest Service in this area include Montana Mountain (Scott's Mountain area) in the Delaware River watershed and the Woodgen Ridge (Musconetcong/Schooley's Mountain area) in the Raritan River drainage. Included within this area is **Hall Mountain**, a steep-sloped, rocky ridge with wetland and upland habitats containing habitat for the rare lobed spleenwort (*Asplenium pinnatifidum*) and historical occurrences of the federally listed endangered small whorled pogonia.

**Black River** is a complex of unfragmented forest and contiguous wooded swamp supporting nesting by barred owl and American bittern (*Botaurus lentiginosus*), as well as several rare plant occurrences such as the federally listed threatened swamp pink, federal candidate variable sedge, low rough aster (*Aster radula*), New England blackberry (*Rubus semisetosus*), three-leaved Solomon's seal (*Smilacina trifolia*), Fraser's St. John's-wort (*Triadenum fraseri*), and cuckoo flower (*Cardamine pratensis* var. *palustris*).

**VII. THREATS AND SPECIAL PROBLEMS:** The most significant threat to the Highlands is the continued loss and fragmentation of the area's forests and wetlands. For many of these forest lands, there is no regulatory protection. There are several large parcels of land that are currently threatened by development. The Sterling Forest Development Corporation had plans to develop over 1,619 hectares (4,000 acres) of Sterling Forest for residential and commercial uses and another 324 hectares (800 acres) for recreational areas in the heart of the Highlands. In addition to the direct destruction of habitat, the proposed development would have fragmented the remaining habitat, jeopardizing the maintenance of viable populations of area-sensitive and wide-ranging species. As of the date of this document, the federal government and the states of New York and New Jersey had pledged funds to purchase 90% of Sterling Forest, with a need

for additional funds to be raised prior to 1998.

With completion of the water filtration facilities for the city of Newark, the 14,165 hectares (35,000 acres) of lands that were preserved for water supply in the Pequannock watershed may be sold and/or developed. Picatinny Arsenal, a 2,482-hectare (6,000-acre), mostly forested site owned by the U.S. Department of the Army, may be phased out and sold in the near future. The extension of Interstate 287 through the Highlands has increased both the accessibility of areas and development pressure in the Highlands. In addition to these large parcels, the cumulative impact of development of smaller parcels throughout this area will be significant. An analysis of private forest land ownership by the U.S. Forest Service indicates that the majority of privately owned forest is in small parcels (less than 20 hectares [50 acres]), making acquisition or protection of these areas difficult. Loss of forest habitat will reduce the suitability of this area for forest interior species, degrade water quality, and likely increase flooding of downstream areas. Loss of habitat will also fragment the mostly unbroken forested corridors connecting the Highlands from the Taconics and New England on the north to the Appalachian Ridges and Pennsylvania to the south.

Based on macroinvertebrate sampling, several streams in the Highlands, including the Ramapo River at Harriman and Waywayanda Creek below Warwick, were severely degraded in 1991. These degraded stream segments are related to sewage treatment plant discharges upstream. Destruction, disturbance, or collapse of abandoned mines used by Indiana bat and other hibernating bats in the Highlands will reduce the habitat available for these regionally and nationally rare species. The proposed Mt. Hope waterpower project may damage one known location of the Indiana bat.

A recent infestation of the hemlock wooly adelgid in the Northeast has killed hemlocks in some parts of the Highlands and will likely affect much or all of the hemlock forest in the Highlands, including some old growth hemlock forests. Losses of these hemlocks will change the composition of these areas and reduce the suitability for certain plant and animal species.

**VIII. CONSERVATION RECOMMENDATIONS:** It is critical to the resources of the Highlands that the network of open space within the Highlands be protected and expanded in order to maintain the unfragmented forest core from the glacial moraine north to the Hudson and across the Hudson to the Connecticut border with linkages on forested ridges to the Delaware River to the south. All publicly owned land that is not currently protected open space, such as the Picatinny Arsenal and various city-owned watershed lands in the Pequannock watershed, should be transferred to public ownership for management as preserve areas. Large privately owned parcels that are threatened by development, especially Sterling Forest, should be acquired and transferred to state or federal conservation agencies or protected through conservation easements or other means. In addition to acquisition efforts, there need to be state and local incentives to maintain open space, especially forested areas. Because many of the habitat values of the Highlands are based on its large tracts of unfragmented forests and wetlands, these large areas must be preserved intact. Protecting only the small and localized rare communities will not be sufficient.

Much conservation attention has been focused on the Highlands in recent years, including the *New York-New Jersey Highlands Regional Study* by the U.S. Forest Service, *A Plan for Action* by the New Jersey State Skylands Greenway Taskforce, and *The New Jersey Highlands: Treasures at Risk* by the New Jersey Conservation Foundation. All these publications, two of which resulted from studies, recommend a regional approach to planning and conservation. The

Skylands Greenway Task Force made two major recommendations: "first, that nothing short of a comprehensive regional approach to planning and coordinated efforts by federal, state, local, and private groups will be effective in the face of current trends; and, secondly, that there is a significant planning and regulatory gap with regard to the protection of contiguous forest lands and the resources they support, including water supply, air quality, and habitat values." The task force further recommends the designation of a Skylands National Greenway and Greenway Council at both state and federal levels and enactment of the Highlands Commission at both state and federal levels with the planning and regulatory authority to protect and manage the crucial lands and critical natural resources.

The core area for conservation in the Highlands should be the contiguous forest and wetland area within the Highlands physiographic province from the moraine north to the Hudson River. Within this area, the large network of publicly owned open space in this area should be expanded to include all remaining undeveloped areas, whether through acquisition, conservation easements, or other means. Focus areas defined in several other studies, including those by the U.S. Forest Service and the Regional Plan Association and Highlands Coalition, highlight privately owned lands, whereas the focus of the core habitat area in this narrative is the entire biogeographic unit of importance, regardless of ownership. The U.S. Forest Service study includes four units within the core habitat area based on relatively undeveloped contiguous forest lands, key water resources, key wildlife habitat, and recreational and cultural opportunities. These units are, from north to south, Black Rock Forest/Schunnemunk Mountain, Sterling Forest/Wanaque Watershed/Wyanokie Highlands, Pequannock Watershed, and Farny Highlands Watershed. The Regional Plan Association identified smaller units ("Critical Treasures of the New York - New Jersey Highlands"), including, from north to south, Schunnemunk Mountain, Sterling Forest, Ramapo Mountains, Wyanokie Highlands, Pequannock Watershed, Hamburg Mountain, Farny Highlands East, and Farny Highlands West.

The area northeast of the eastern shore of the Hudson River and extending to the New York-Connecticut state line contains many similar habitat values as the core area west of the river, and is also under heavy development pressure. There has been less of a focus on surveying and conservation of this area, so data are scarcer. Additional survey work in this area would be helpful in determining critical areas. It is important to build upon the existing open space in the Hudson Highlands and Fahnestock State Parks and Croton Reservoir lands to develop a core area in the eastern Highlands similar to that west of the Hudson. The Environmental Law Foundation has developed a plan for a greenway in the eastern part of the Highlands, in northern Putnam County from the Hudson River east to the Great Swamp. This major open space preservation effort should be supported and expanded into southern Dutchess County. In addition to wildlife corridors, scenic corridors and greenways should be created and maintained, especially along the Appalachian Trail.

South of the moraine and core area in New Jersey, the focus should be on preserving the existing forested ridges and maintaining the network of agricultural lands and grasslands in the valleys. Important areas for grassland-nesting birds should be identified, protected, and managed. The U.S. Forest Service identified two important areas in this southern region, Montana Mountain and Woodgen Ridge, and the Regional Plan Association identified four areas: Pequest Valley, Musconetcong River and ridges, Morris Canal, and the Delaware River sites.

Research is needed on natural control of the hemlock wooly adelgid and overall strategies developed as to what kinds of management, if any, should be undertaken to replace hemlock in the forest canopy. This could include replacement with disease-resistant hemlocks or some other

species.

The states of New Jersey and New York should work together to conduct detailed populations studies and investigate impacts of continued take of bobcat in this part of New York State.

The states need to agree on stream classification and to develop and implement water management policies and standards that will safeguard water quality in this region.

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#### Municipalities of the New York - New Jersey Highlands physiographic province

##### **New Jersey**

##### **Bergen County**

Mahwah

Oakland

##### **Hunterdon County**

Alexandria

Bethlehem

Bloomsbury

Califon

Clinton Town

Clinton Township

Glen Gardner

Hampton

High Bridge

Holland

Lebanon Borough

Lebanon Township

Milford

Tewksbury

Union

##### **Morris County**

Boonton Town

Boonton Township

Butler

Chester Borough

Chester Township

Denville

Dover

Hanover

Harding

Jefferson

Kinnelon

Mendham Borough

Mendham Township

Mine Hill  
Montville  
Morris Plains  
Morris Township  
Morristown  
Mount Arlington  
Mount Olive  
Mountain Lakes  
Netcong  
Parsippany-Troy Hills  
Pequannock  
Randolph  
Riverdale

Rockaway Borough  
Rockaway Township  
Roxbury  
Victory Gardens  
Washington  
Wharton

**Passaic County**

Bloomingdale  
Pompton Lakes  
Ringwood  
Wanaque  
West Milford

**Somerset County**

Bernardsville  
Far Hills  
Peapack-Gladstone

**Sussex County**

Byram  
Franklin  
Hamburg  
Hardyston  
Hopatcong  
Ogdensburg  
Sparta  
Stanhope  
Vernon

**Warren County**

Allamuchy  
Alpha  
Belvidere  
Franklin  
Greenwich

Hackettstown  
Harmony  
Independence  
Liberty  
Lopatcong  
Mansfield  
Oxford  
Phillipsburg  
Pohatcong  
Washington Borough  
Washington Township  
White



**New York****Dutchess County**

Beekman  
East Fishkill  
Fishkill  
Pauling

**Orange County**

Blooming Grove  
Chester  
Cornwall  
Highlands  
Monroe  
Tuxedo  
Warwick  
Woodbury

**Putnam County**

Carmel  
Kent  
Patterson  
Philipstown  
Putnam Valley  
Southeast

**Rockland County**

Haverstraw  
Ramapo  
Stony Point

**Westchester County**

Cortlandt  
Peekskill  
Somerset  
Yorktown

**Connecticut****Fairfield County**

New Fairfield  
Sherman

There are 114 additional state-listed species in the New York - New Jersey Highlands habitat complex

**State-listed endangered - New Jersey**

blue-spotted salamander (*Ambystoma laterale*)  
timber rattlesnake (*Crotalus horridus*)  
Cooper's hawk (*Accipiter cooperii*)  
red-shouldered hawk (*Buteo lineatus*)  
northern harrier (*Circus cyaneus*)  
short-eared owl (*Asio flammeus*)  
bobcat (*Lynx rufus*)

Bradley's spleenwort (*Asplenium bradleyi*)  
lobed spleenwort (*Asplenium pinnatifidum*)  
glade fern (*Athyrium pycnocarpon*)  
variegated horsetail (*Equisetum variegatum*)  
stiff clubmoss (*Lycopodium annotinum*)  
brownish sedge (*Carex brunnescens*)  
Bush's sedge (*Carex bushii*)  
clustered sedge (*Carex cumulata*)  
dry-spiked sedge (*Carex siccata*)  
dwarf bulrush (*Hemicarpha micrantha*)  
Virginia bunchflower (*Melanthium virginicum*)  
rosy twisted-stalk bellwort (*Streptopus roseus*)  
puttyroot (*Aplectrum hyemale*)  
three-birds orchid (*Triphora trianthophora*)  
side-oats gamma grass (*Bouteloua curtipendula*)  
slender wheatgrass (*Elymus trachycaulus*)  
American mannagrass (*Glyceria grandis*)  
long-awned smoke grass (*Muhlenbergia capillaris*)  
puff-sheath dropseed (*Sporobolus neglectus*)  
Robbins' pondweed (*Potamogeton robbinsii*)  
white-stem pondweed (*Potamogeton praelongus*)  
northern yellow-eyed grass (*Xyris montana*)  
hemlock-parsley (*Conioselinum chinense*)  
swamp or low rough aster (*Aster radula*)  
water marigold (*Bidens beckii*)  
false boneset (*Kuhnia eupatorioides*)  
stiff goldenrod (*Solidago rigida*)  
witch hobble (*Viburnum alnifolium*)  
slender pinweed (*Lechea tenuifolia*)  
bog rosemary (*Andromeda glaucophylla*)  
creeping snowberry (*Gaultheria hispidula*)  
Carolina wood vetch (*Vicia caroliniana*)  
Torrey's mountain mint (*Pycnanthemum torrei*)  
grooved yellow flax (*Linum sulcatum*)  
dwarf plantain (*Plantago pusilla*)  
early buttercup (*Ranunculus fascicularis*)  
spreading globe flower (*Trollius laxus* ssp. *laxus*)  
round-leaved serviceberry (*Amelanchier sanguinea*)  
marsh cinquefoil (*Potentilla palustris*)  
foamflower (*Tiarella cordifolia*)  
northern blue violet (*Viola septentrionalis*)  
mountain holly (*Ilex montana*)  
redbud (*Cercis canadensis*)  
northern white cedar (*Thuja occidentalis*)  
table mountain pine (*Pinus pungens*)

**State-listed threatened - New Jersey**

longtail salamander (*Eurycea l. longicauda*)  
wood turtle (*Clemmys insculpta*)  
American bittern (*Botaurus lentiginosus*)  
pied-billed grebe (*Podilymbus podiceps*)  
great blue heron (*Ardea herodias*)  
osprey (*Pandion haliaetus*)  
long-eared owl (*Asio otus*)  
barred owl (*Strix varia*)  
red-headed woodpecker (*Melanerpes erythrocephalus*)  
cliff swallow (*Hirundo pyrrhonata*)  
grasshopper sparrow (*Ammodramus savannarum*)  
savannah sparrow (*Ammodramus sandwichensis*)  
bobolink (*Dolichonyx oryzivorus*)

**State-listed endangered - New York**

lobed spleenwort (*Asplenium pinnatifidum*)  
Virginia pine (*Pinus virginiana*)  
cylindrical headed bulrush (*Scirpus novae-angliae*)  
pointed watermeal (*Wolffia papulifera*)  
American waterwort (*Elatine americana*)  
side-oats gamma grass (*Bouteloua curtipendula*)  
Torrey's mountain mint (*Pycnanthemum torrei*)

**State-listed threatened - New York**

northern cricket frog (*Acris c. crepitans*)  
timber rattlesnake (*Crotalus horridus*)  
eastern mud turtle (*Kinosternon subrubrum*)  
red-shouldered hawk (*Buteo lineatus*)  
northern harrier (*Circus cyaneus*)  
osprey (*Pandion haliaetus*)  
angled spikerush (*Eleocharis quadrangulata*)  
weak rush (*Juncus debilis*)  
tall tick-trefoil (*Desmodium glabellum*)

**State-listed special concern animals - New York**

spotted salamander (*Ambystoma maculatum*)  
blue-spotted salamander (*Ambystoma laterale*)  
eastern hognose snake (*Heterodon platyrhinos*)  
wood turtle (*Clemmys insculpta*)  
least bittern (*Ixobrychus exilis*)  
Cooper's hawk (*Accipiter cooperii*)  
short-eared owl (*Asio flammeus*)  
common barn-owl (*Tyto alba*)  
common nighthawk (*Chordeiles minor*)  
eastern bluebird (*Sialia sialis*)

grasshopper sparrow (*Ammodramus savannarum*)  
vesper sparrow (*Pooecetus graminus*)  
northern long-eared myotis (*Myotis septentrionalis*)

### **State-listed rare plants - New York**

Atlantic white cedar (*Chamaecyparis thyoides*)  
spongy arrowhead (*Sagittaria calycina* var. *spongiosa*)  
Ohio spiderwort (*Tradescantia ohiensis*)  
Emmon's sedge (*Carex albicans* var. *emmonsii*)  
hay sedge (*Carex argyrantha*)  
Bicknell's sedge (*Carex bicknellii*)  
Bush's sedge (*Carex bushii*)  
hirsute sedge (*Carex complanata*)  
clustered sedge (*Carex cumulata*)  
heavy sedge (*Carex gravida*)  
false hop sedge (*Carex lupuliformes*)  
red-rooted flatsedge (*Cyperus erythrorhizos*)  
salt marsh spikerush (*Eleocharis halophila*)  
dwarf bulrush (*Hemicarpha micrantha*)  
woods-rush (*Juncus subcaudatus*)  
slender crabgrass (*Digitaria filiformis*)  
blazing star (*Chamaelirium luteum*)  
smooth bur-marigold (*Bidens laevis*)  
swamp birch (*Betula pumila*)  
pinweed (*Lechea racemulosa*)  
slender pinweed (*Lechea tenuifolia*)  
field dodder (*Cuscuta campestris*)  
five-angled dodder (*Cuscuta pentagona*)  
violet brush clover (*Lespedeza violacea*)  
Carolina crane's-bill (*Geranium carolinianum* var. *spaerospermum*)  
hidden-fruited bladderwort (*Utricularia germiniscarpa*)  
small floating bladderwort (*Utricularia radiata*)  
grooved yellow flax (*Linum sulcatum*)  
yellow harlequin (*Corydalis flavula*)  
threadfoot (*Podostemum ceratophyllum*)  
slender knotweed (*Polygonum tenue*)  
spreading globe flower (*Trollius laxus* ssp. *laxus*)  
swamp agrimony (*Agrimonia parviflora*)  
woodland agrimony (*Agrimonia rostellata*)  
sharp-wing monkeyflower (*Mimulus alatus*)

1. <sup>1</sup>Species of special concern listed here include former Category 2 candidates.